What is claimed is:

1. A method of producing particles comprising the steps of:

providing a supercritical fluid;

providing a first solution, the first solution comprising a first solute dissolved or dispersed in a first solvent that is at least partially soluble in the supercritical fluid;

flowing the supercritical fluid through a chamber having a rotating rotor disposed therein;

dispensing the first solution into a mixing zone within the chamber while the supercritical fluid is flowing through the chamber, the mixing zone being defined as a space between an inner wall of the chamber and an adjacent surface of the rotating rotor; and

collecting precipitated particles of the first solute from a mixture comprising the supercritical fluid and the first solvent.

2. The method of producing particles according to claim 1 wherein the rotating rotor intimately mixes the first solution and the supercritical fluid together via shear mixing, turbulent mixing and/or centrifugal mixing.

3. The method of producing particles according to claim 1 wherein the first solution is dispensed into the mixing zone through one or a plurality of ports provided in the inner wall of the chamber.

4. The method of producing particles according to claim 1 wherein the rotating rotor is a smooth drum, a grooved drum, a propeller rotor or a turbine rotor.

5. The method of producing particles according to claim 1 wherein the rotor rotates within the chamber at a speed of from about 100 to about 20,000 RPM when the solution is being dispensed into the mixing zone.

6. The method of producing particles according to claim 1 wherein the inner wall of the chamber is spaced apart from the surface of the rotating rotor a distance of from about 0.1 mm to about 2.5 mm.

7. The method of producing particles according to claim 1 further comprising the steps of:

providing a second solution, the second solution comprising a second solute dissolved or dispersed in a second solvent that is at least partially soluble in the supercritical fluid; and

dispensing the second solution into the mixing zone at the same time the first solution is being dispensed into the mixing zone.

8. The method of producing particles according to claim 7 wherein the first solution is dispensed into the mixing chamber through a first solution port and the second solution is dispensed into the mixing chamber through a second solution port.

9. The method or producing particles according to claim 8 wherein the first solution port and the second solution port are coaxial.

10. The method of producing particles according to claim 8 wherein the first solution port and the second solution port are formed in the inner wall of the chamber at different locations within the mixing zone.

11. The method according to claim 7 wherein the first solvent and the second solvent are the same.

12. The method according to claim 1 wherein the first solute is selected from the group consisting of biologically active materials, medicinal agents, sugars, pigments, toxins, insecticides, viral materials, diagnostic aids, agricultural chemicals, nutritional materials, proteins, alkyloids, alkaloids, peptides, animal and/or plant extracts, dyes,

explosives, paints, polymer precursors, cosmetics, antigens, enzymes, catalysts, nucleic acids, and combinations thereof.

13. The method according to claim 1 wherein the supercritical fluid is carbon dioxide.

14. The method according to claim 1 wherein the first solution comprises an emulsion.

15. The method according to claim 1 wherein the first solution comprises a suspension of the first solute in the form of solid phase particles dispersed in the first solvent.

16. The method according to claim 15 wherein a polymer, lipid and/or excipient is dissolved in the first solvent, and the precipitated particles collected in the collecting step comprise have a core comprising the first solute and a shell comprising the polymer, lipid and/or excipient.

17. The method according to claim 1 wherein the particles collected in the collecting step are substantially uniform and have an average diameter of less than about 5 μm.

18. The method according to claim 1 further comprising the step of:
adjusting the rotational speed of the rotor, the size of the space between the inner surface of the chamber and the adjacent surface of the rotor, and/or the flow rate of the supercritical fluid and/or first solution into the chamber to obtain precipitated solute particles having a desired average particle size.

19. Particles formed according to the method of claim 1.

20. An apparatus for forming particles comprising:

a vessel having an inner wall that defines a chamber;

a rotatable rotor disposed within the chamber;

a mixing zone within the chamber, the mixing zone being defined as a space between the inner wall of the chamber and an adjacent surface of the rotatable rotor;

a supercritical fluid inlet for flowing a supercritical fluid into the chamber;

a solution inlet provided in the inner wall of the chamber for flowing a solution into the mixing zone, the solution comprising a solute dissolved or dispersed in a solvent; and

means for collecting particles of solute from a mixture comprising the solvent and the supercritical fluid.